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ABSTRACT

The growth and development of distance learning (DL) programs is on the rise. This review examines the literature looking for instructional techniques and methods for the teacher desiring to use DL technology to maximize student achievement and cognitive development and to increase interaction. The three major relationships within the instructional process (student-teacher, student-student, and student-material) are positively affected by interaction through the use of communication technology. The literature supports higher quality DL when interactive technology is used. various interactive technologies used in digital learning today are e-mail/digital mailbox, group work/pages, group appointments, individual appointments, Web research/online library resources, presentations, Web site assignments, discussion boards, virtual classroom, videotape/videostreaming, and audio (CD)/audiostreaming. All of these possibilities have been used to some extent in the Jacksonville State University DL program. To provide the broadest perspective possible, this paper describes the potential uses of interactive method. As many of these interactive possibilities as feasible should be used to enhance the presentation of instruction and the learning process. A learner-centered environment and instructor as guide can be accomplished in the classroom and in distance learning through interaction of the student with teacher, other students, and the material either synchronously or asynchronously. Going the distance for the active learner takes planning and the understanding of the available interactive distance learning possibilities. (Contains 11 references.) (SLD)

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Going the Distance: Active Learning

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ABSTRACT

The growth and development of distance learning (DL) programs is on the rise. We reviewed the literature looking for instructional techniques and methods for the teacher desiring to use DL technology for maximizing achievement, student cognitive development and increasing student interaction.

A multiplicity of interactive distance learning possibilities exist to promote active learning, be it in the form of constructivism, progressive education or behaviorism. Interactive technology can be used to develop a bond between instructor and student lie the one established in a traditional classroom setting. The three major relationships within the instructional process student - teacher, student - student, and student - material are positively affected by the interaction through use of communication technology. Literature supports higher quality DL when interactive technology is used.

The various interactive technologies that are used in distance learning today are Email/digital mailbox, group work/pages, group appointments, individual appointments, web research/Online library resources, presentations, website assignments, discussion boards, virtual classroom, videotape/videostreaming, and audio(CD)/audiostreaming. All of these possibilities have been used to some extent in the Jacksonville State University DL program. To provide the broadest perspective possible, all potential uses of each interactive technology method will be described. As many of these interactive possibilities as feasible should be used in order to enhance the presentation of instruction as well as the learning processes.

A learner centered learning environment and instructor as guide can be accomplished in the classroom and in distance learning. This learning can be accomplished through interaction of the student with teacher, other students, and the material either synchronously or asynchronously. Going the distance for the active learner takes planning and the understanding of the available interactive distance learning possibilities!

Emerging research informs us that for the teacher to make the most of new technologies, especially in the case of high-level cognitive skills, especially in the case of high-level cognitive skills, he or she must become a facilitator, collaborator, and guide who makes instruction learner centered. This shift in the teacher's role is in accordance to the implementation of distance learning educational systems.

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Two key aspects of the collaborative networked learning environment are the constructivist approach to learning and cognitive flexibility theory (Jacobson and Spiro, 1994; Jacobson and Spiro, 1995; Spiro, Feltovich, Jacobson, and Coulson, 1992; Spiro et al., 1992). The higher-levels of the domain (analysis, synthesis and evaluation) are now coming to the forefront as we teach how to think, *critical/conceptual thinking*, not what to think. How do we teach the higher-level cognitive skills using DL?

In order to teach higher-level skills with distance learning technology, a set of design factors that incorporate the learning processes and effectively blends those factors with technology must be achieved. The design factors presented were synthesized from the constructivist epistemology and can be adapted to many cognitive styles. It should be noted that these design factors are interdependent, and can be used in various combinations.

Design Factors

There are many considerations to address when designing lessons for classroom instruction. This article will address 13 design factors that could be helpful to consider when planning to develop a distance learning program for your instructional environment.

1. Embed learning activities in an overarching scenario: In Distance Learning all activities must be related, and they should be considered building blocks for successive activities to be addressed. But how do you present these activities as a coordinated whole? You must have a common theme or story that runs through the entire lesson, class, or course—one that provides an internal coherence. Some examples would include a particular event in history, a story in literature, or a case study that could be the unifying thread that is the overarching scenario. An example of an overarching scenario in practice would be teaching how to write a test using interactive television. Each student uses a lesson in one of the textbooks he/she would use as a

classroom teacher. The common theme for the entire test and measurements course is the students selected chapter from the chosen text. The students would then write the objectives, use various types of test items, construct the test, administer the test, and critique the test using their selected textbook materials.

In implementing this overarching scenario as a classroom teacher you would assign work in the classroom to one group and escort another group to the library or incorporate some other instructional activity. This technique would also be utilized in a distance learning program. New terminology has been related to these particular instructional activities; synchronous and asynchronous interaction. The group of learners that is engaged in the distance learning lesson is completing the asynchronous activity, and the group that is completing the alternative activity under the supervision of the teacher is considered as addressing the synchronous interaction. The key to both groups achieving success is careful planning of well-structured learning opportunities.

2. **Employ rich learning activities**; Rich, in this instance, means fertile. This can be defined as ample examples and ones that exercise the three higher-levels of cognition because they provide an opportunity for ample plausible interpretations. Rich also means deep, as in vivid and strong. These learning activities should be such that they imprint on the long- and short-term memory for transfer of knowledge.

Fundamental to understanding of human cognition is an appreciation for the complex interactions between cognitive abilities and motivation. Effectiveness of instruction can also be increased through heightened student motivation. Heightened motivation creates an emotional component that increases retention and increases the amount of time the student is engaged with the learning material. Simulations, games, and exploration are used in the classroom today;

usually paper-based or board games. With the computer in the classroom, more sophistication is being made available. However, our students have become accustomed to a high level of interest in materials and to sustaining a lengthy period of engagement in activities through such things as playing Dungeons and Dragons and other highly sophisticated games in arcades and at home.

How do educators learn the motivational techniques, the embedding techniques that these games use to provide information for the game player to reach the next level of play? What is the process? Game players learn how to play the games from peers and/or mentors who provide constant feedback. One learns very quickly the consequences of a mistake when the dragon eats you and the game is over. Children and adults playing sophisticated games will persist past our usual concept of tolerable frustration to achieve a goal in a game. Stoney and Oliver (1997) explain how learners are motivated: immersion, reflection, flow, collaboration, learner control, curiosity, fantasy, and challenge.

3. Use pictures, not text, to the extent possible: Remember the old adage, a picture is worth a thousand words? In Distance Learning, this is one adage that is like money in the bank. However, the difficulty lies in deciding which pictures are delivering the right thousand words. Do you use cartoons, photographs, graphics, and a combination? What combination contains all the skills that need to be learned? When and where do you introduce the picture? Today's technology allows for realistic graphics, animation, simulation, and real life-videos.

In any learning situation the teacher attempts to relate learning to real life situations of the student. The use of a myriad of technological resources on the Internet allows for the selection of many appropriate picture options. There are program managers for the "pictures" to assist in the mechanics of delivery, such as the Toolbook-based Electronic Trainer from Utah State University.

4. Embed the data needed to solve problems in the learning context: Learning is the retention and transfer of knowledge to new and different situations. Some organizational influences in cognitive learning that affect learning in context are attitudes/values, knowledge, skills, and experience. To account for these influences, you must develop protocols (as used in medicine, procedures), scenarios, models, and configurations that account for the interplay of these organizational factors. To do this you must establish a knowledge base that is modular and embedded in experience of the learner.

One example using word problems in math follows. everything is given; the student must extract the salient parts to solve the problem. This process is the foundation of the macrocontext and the learning activities that are based on vignettes. As skills build, knowledge from previous, related vignettes can be retrieved for another use in the current vignette.

5. **Have students provide "story" resolutions before they are exposed to "expert" solutions**: The contructivist approach, simply stated, asserts that meaning is constructed by the learner, and not imparted by the teacher. Today the classroom teachers impart knowledge, to give the students what they, the teachers, know. It does not always work that way. Why? Because the way the teacher learned the material may not be the way a student can process the material. Johnny was told to sit up straight and keep his eyes open as the teacher read the story to the class. However, Johnny was listening to the teacher with his eyes closed, visualizing the story. But sitting up in class and watching the teacher read, he saw the other students and was distracted. The cognitive flexibility theory states that information, procedures, and principles are best applied using the judgement of the problem solver in a given situation.

Place the student in a role that requires solutions to a problem. Math teachers give students numbers to manipulate. However, a truer test of a student's ability to do math is word problems

that involved a context. (Unfortunately, many of the problems used today are devoid of interest or meaning for the student). The thought process involved in solving a real life problem is the basis for DL development. Another example is the reading of a story in the primary grades and having the children supply an ending to the story. The thought process is then explored prior to the teacher providing the ending.

6. **Support multiple links among concepts:** Multiple links is the provision of information so that the multiple intelligence theory of Gardner (linguistics, logical, musical, spatial, bodily, intrapersonal, interpersonal, and intelligence of the naturalist) is available and students can pick and chose from information and create their own learning. An example would be the identification of major cities and their states as part of a geography lesson. This can be accomplished by matching sports teams in baseball, football, and basketball to city and state. You can use a crossword puzzle containing clues such as, "State with the hotdog capital? (Kentucky)" or a game of baseball, divide the class into two teams, and let the batters select different types of hits, which determine the difficulty of the geography question. Another activity is to have students add the two-letter post office abbreviation to a list of United States cities.

7. Present knowledge from multiple perspectives: Presenting knowledge from multiple perspectives is nothing more than providing the resources that a person would use to gather information with which to reach a decision. An example would be planning a vacation. You could use AAA, a travel agency, airlines, web sites, friends who have traveled, state and local tourist agencies, etc. Access would be provided to each of these agencies and helpful hints given to explain how to process the perspective that is embedded in each source of information. Just as you must synthesize the information to select where you will go on vacation and what you will do, so, too, must you require synthesis of information in all DL activities.

8. Use active learning techniques Remember the teacher who told you to read the chapter and then answer the questions at the end? Remember how boring and ineffective that learning activity was? Guess what? That teacher is now alive and well in DL. Now you sit in front of a computer screen and read and answer the questions at the end of the lesson. The student in the multiple link concept is active gathering information. Similarly, the student must be active through group interaction, writing, or making graphics associated with learning activities that are part and parcel of answering the problem presented.

9. Stimulate the collaborative process by presenting problems so complex that students must work together to solve them: Collaboration is working with fellow students, the computer, and other resources the student may bring to the problem. Collaboration is a twofold exercise. First you must gather all the pieces of the puzzle. There are very few higher-level cognitive problems where all the information needed to solve the problem rests with one individual. The second aspect of collaboration is that of using individuals as sounding boards to "try out " the thought process, to obtain other views of the situation.

When ideas or thoughts are told to another person, the simple process of hearing the thought spoken aloud makes it clearer. Each of us has a friend, family member, or colleague whose opinion we value—they are a sounding board. This must be built into DL. This collaborative aspect must be explored by providing small group sections or other electronic means (email, chat rooms, peer buddy lists, and subject matter expert/facilitator/instructor managed group discussion on bulletin board).

10. Support continual self-assessment: In the classroom there is a bond, an agreement, between teacher and students that the teacher will help the students learn. The teacher to do this, has learned the process of education (objective writing, lesson planning, learning activities,

formative and summative evaluation, etc). The teacher is also there to answer questions, and can sense through student verbal and nonverbal feedback whether or not they understand the presentation. However, what is the process in the construction of lessons when using technology and when the teacher is not there to see the puzzled look or to answer questions? The same bond between the instructor and student in the classroom must be developed in DL.

Can students apply their knowledge, skills, and understanding to real world situations? The educator must develop instruction that embeds assessment task and evaluation criteria that are diagnostic and prescriptive to the student's uses as part of their development of analysis, synthesis, and evaluation, but also as aspects of their performance assessment (Young, 1995). Instruction is created that enhances the students' success rate and performance on a given task. Evaluation is feedback, not a performance measurement. Evaluation (or a better term, assessment) must be diagnostic and prescriptive, formative and iterative, and must involve peers and group assessment—both for feedback and as a learning activity. The peer and group assessment provides the assessors another view/processing of the same material. Summative evaluation in DL should not be a test, it should be a project.

Continual self-assessment is provided through facilitation, diagnostic and prescriptive assessment checklists, on-demand subject matter expert feedback through vignettes, or email, chat rooms, peer buddy lists, and SME/Facilitator/instructor managed group discussion on bulletin board. These same support mechanisms can be used to provide the wherewithal to think "outside of the box" that students need to be pushed to accomplish.

11. Provide support at critical junctures to push student past current limitations: You have all seen pictures that project different images or meanings for different viewers. The same thing happens in learning cognitive skills. Because of students' previous experiences, background, and

values, they approach a problem from a particular avenue of attack. While there is nothing wrong with a particular student's view, the student should be cued on "further considerations." These cues can be provided at critical decision points by an "expert" who interrupts and asks a question or relates a similar experience and how they approached the problem. The key is—as the student centered learning process moves forward, the facilitator has a "checkup" to insure the *student* is moving forward. Another way to look at current limitations is to think in terms of developmental levels. A stage of development at which a student can function in a proficient manner is the current limit on his solitary performance—much as a baby who can adeptly crawl is proficient, but limited in his mobility. With something to lean on, an idea or technique supplied at the right time in the process, the student can begin to move from crawl to walk.

12. Expose students to expert performance: Expert performance can be provided in several ways. A recognized expert can be the instructor on the CD ROM or video. There can be cameo appearances at key decision junctures either before or after the decision. The formative or summative evaluation can be conducted by the expert.

13. Provide pairs of related stories (vignettes) to learning to establish transfer outside the macrocontext: The concept of the macrocontext is a constant reinforcement of the parts and their interrelations as you build toward the conclusion of the lesson. This macrocontext provides the framework for long-term memory and gives the student a frame of reference. Related stories exercise the frame of reference and develop the patterns for transfer of learning in the particular lesson. An example would be teaching crimes against humanity and using the macrocontext of Nazi Germany against the Jews in World War II. The concepts and principles could be used in related stories such as Rwanda between the Tutsi and Hutu and the Serbian-Kosovo conflict of 1999. Can the student relate a framework for viewing one situation to his or her framework for

viewing the other situation? Does the framework really provide enlightenment for both situations or can important differences be identified that require some change?

In summary, we have offered a rationalization and guidelines for teaching teachers the process side of DL as well as the system side so that they can use the power of hypermedia to create a new generation of more adaptive and flexible thinkers. An ineffective classroom teacher is really ineffective on the network! An effective teacher who does not understand that DL is both a system and a process and does not apply the 13 design features will put a roomful of Dexadrine addicts into suspended animation that would make Sleeping Beauty look like an insomniac.

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